SMART WALKING STICK FOR BLIND

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Abstract-

The smart walking Stick helps blind people in moving and allowing them to perform their work easily and comfortably. In normal cane or stick, the detection of the obstacle is done by using the sensor. But it is not efficient in the case of visually impaired persons. Because the blind person does not know what type of things or what type of the objects come in front of him or her .The blind person cannot recognize what is the size of that object and how far is he from the object. So it is difficult for blind person to move here and there. But smart walking stick supports Object recognition and output comes mainly in the form of Voice output.In Smart Walking Stick, we detect the object with the help of a camera. The stick measures the distance between objects and Smart Walking Stick by Ultrasonic sensor.When the objects or obstacles come in range of the ultrasonic sensor, the speaker tells the name of obstacle in front of the stick. The smart walking stick is very useful for those people who are visually impaired and are often need help from others. It allows the user to walk freely by detecting obstacles in front of him. Images will be captured using a camera and the camera is connected to the Raspberry Pi. If any obstacle comes in front of blind person, he can know about the obstacle by hearing the sound generated by the head phone.The smart walking stick is very useful for the visually impaired persons for their safety and freedom from the other persons at all the time.

Keywords: **Smart walking stick, Raspberry Pi , Ultrasonic sensor, Object recognition , Voice output**

I.   INTRODUCTION

There are several numbers of people around us which are visually impaired, and among them millions of people are blind and there are thousands of people those who are irreversibly blind. For visually impaired people, performing daily activities is a difficult task since vision plays a central role in almost every activity of ours. The visually impaired people has to rely on their memory to find their belongings and may become irritated if someone replaced the object or it falls down occasionally. It is not possible to search an object in an unknown place or surroundings without having the eye sight. There can be found different technologies such as SONAR based, RFID based, and vision based technologies which was useful for the blind persons. Smart Walking Stick helps the blind people in moving and allowing them to perform their work easily and comfortably. In normal cane or stick, the detection of the obstacle is done by using the sensor. But it is not efficient in the case of a blind person .because the blind person can't able to know what type of things or objects come in front of him and what is the size of that object and how much far is he from that obstacle. So it is difficult for a blind person to move from one place to another. But in the smart walking stick for blind, the output produces in the form of sound.

The smart walking stick for blind detects the images with the help of a camera. The Stick measures the distance between the objects and Smart Walking Stick by using an Ultrasonic sensor. When any objects or obstacles come in range of an ultrasonic sensor then the head phone tell the name of obstacle which is in front of the stick.

The main objective of this project is to design a walking stick which is very much useful for those people who are visually impaired and are often need help from others. It allows the user to walk freely and independently by detecting the obstacles. The obstacles can be detected by using various techniques. The image will be captured using a camera and the camera is connected to the Raspberry Pi. If any obstacle comes in front of the blind person, he will get the information about the obstacle by hearing the sound which was generated by the head phone connected to his ear.

The smart walking stick for blind is a simple and purely mechanical device to detect the obstacles on the ground. This device is light in weight and portable .But its range is limited due to its own size. It provides the best travel aid for the blind. The blind can move from one place to another independently without the others help. The main aim of the system is to provide a efficient navigation aid for the blind persons which gives a

sense of vision by providing the information about their surroundings and objects around them. Various technologies can be used to reduce different barriers that a blind person has to face. These kinds of the technologies are commonly referred to as assistive technology.

II.   LITERATURE SURVEY

The paper[1] Sensor assisted stick for the blind people describes about a wearable equipment which consists of a light weight blind stick and the obstacle detection circuit is based on a sensor .It is mainly developed to help the blind person to move alone safely from one place to another and to avoid any obstacles that may be encountered which may be either fixed or mobile, and thus it may help to avoid accidents. The main component for the working of this system is the infrared sensor which is used to scan a predetermined area around the blind person by emitting-reflecting waves. The reflected signals are received from the objects are used as inputs to the ATMEGA microcontroller. The microcontroller is then used for determining the direction and distance of the objects around the blind person. The main objective of this is to provide an application for blind people to detect the obstacles in various directions, detecting pits and manholes on the ground to make free to walk.

In the paper[2] Obstacle Detection and location finding For Blind People the author describes a device which is used for guiding the person who is blind or partially sighted. The system provides the voice alert to avoid obstacles infront of the blind .it is based on the ultrasonic sensors. An emergency button is added to the system. A RFID is installed into the public building and it is integrated into public building and also into the blind person walking stick. The device is designed as a small and is used with the white cane. The main aim of this system is to develop a system that assist the blind and visually impaired without the help of other person. The system is based on GSM-GPS and hence it takes the advantage of the GSM network such as the popularity and the cost. The RFID technology is used in indoor to assist the blind people, because in the indoor the GPS cannot be

used efficiently .The GSM is also used for sending the alert message to the authorized person. The RFID is used for location detection in indoor and GPS is used for the outdoor location detection.

In the paper [3] multitasking stick for indicating safe path to visually disable people it describes a micro-controller based automated hardware that allows a blind to detect obstacles in front of her or him .The system helps the blind person to navigate easily in a desired area .The hardware part consists of a micro-controller which was incorporated with an ultrasonic sensor, voice play back module and an additional equipment .The ultrasonic waves are used to detect the obstacles. The temperature sensors are provided to detect the fire or high temperature area .The presence of water is detected using the current sensing principle .The acknowledgement from the sensing obstacle is received through the voice play back module. The system can be provided a   RF module which is used to find in the case of a misplaced stick, Because of these features the blind people can be able to move from one place to another independently.

The paper [4] ultrasonic blind walking stick describes an innovative stick which is designed for the visually disabled people for their easy navigation. Ultrasonic blind walking stick is an advanced blind stick that allows visually challenged people to navigate by using new technology. The blind stick is able to detect the light and water by integrated with ultrasonic sensor. In this system the ultrasonic sensors are used to detect obstacles by using ultrasonic waves. By sensing the obstacles the sensor passes the received data to the microcontroller and the microcontroller processes this data and calculates if the obstacle is close enough to the person. If the obstacle is not close to the microcontroller the circuit does not do anything. If the obstacle is close enough to the microcontroller it sends a signal for sound a buzzer. It also detects water and provides different sounds and alerts the blind. The other feature is that it allows the blind to detect if there is light or darkness in the room.

III.   IMPLEMENTATION

A. RASPBERRY PI

The Raspberry pi with low power consumption is used for implementing the smart walking stick. It is a full-fledged and having a credit card sized computer, and have a full Linux based operating system and has hardware support for SPI, I2C and Serial and this have an ability to run different programs. Hence the entire System is implemented using Raspberry Pi and the python language.

Figure 1 Raspberry pi

The ultrasonic sensor HC - SR04 provides 2cm - 400cm measurement range and its ranging accuracy can reach to 3mm.It includes ultrasonic transmitters, receiver and control circuit. The basic principle of the work is as follws:

- Trigger for at least 10us high level signal using IO
- Automatically sends eight 40 kHz and detect whether there is a pulse signal back.
- If the signal is back, with high level , time of high output IO duration is the time from sending ultrasonic to returning.

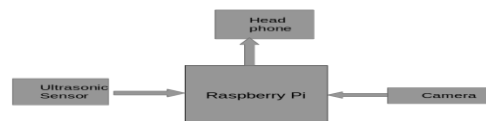Distance = (time at high level×velocity of sound (340M/S) / 2

B. BLOCK DIAGRAM

Figure 2 block diagram

The system consists of a walking stick including a USB camera, Ultrasonic sensor, Raspberry pi and a head phone attached to it. The raspberry pi is the central controller of the system. The raspberry pi allows the ultrasonic sensor to continuously measure the distance to the obstacles appearing across it. The Ultrasonic sensor calculates the distance by using the time taken for ultrasonic waves to reach and reflect from the obstacle

We need to find the obstacles within a range of 1 meter. So initially we set the ultrasonic sensor to detect the objects within 1 meter only. If the obstacle is within 1 meter range, then the ultrasonic sensor sends signal to the raspberry pi. Then raspberry pi enables the USB wired camera attached to it.

When the camera is activated, it captures the image appeared across it. The captured image is also sent to the raspberry pi at the same time.

Raspberry pi keeps the image dataset which consists a lot of collected samples of the different obstacles. The images which were sent from the camera are compared with the images stored in the dataset using the image processing. A head phone is connected to the raspberry pi to be used by the user. When the comparison succeeds in finding the object, it gives the output of object name as voice through the head phone, which was used by the user. Whole this process is programmed in Python programmimg language.

IV. CONCLUSION

The Smart Waking Stick for blind is an embedded system which is to be implemented with an aim to reduce the complexities of the blind people. With this system , the blind people will be able to move from one place to another place without the help from others. It will act as a basic platform for the generation of more such devices for visually impaired and it will be real boon for the blind. The developed system gives good results in detecting obstacles in front of the user.In this system the sensors play an important key role to detect the objects infront of the blind to make free to walk for the blind people .Due to these features it is best equipment for the blind and visually impaired people for walking on the road.Hence the system can solve the problems faced by the blind in their daily life. The system also takes measures to ensure their safety.

REFRENCES

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